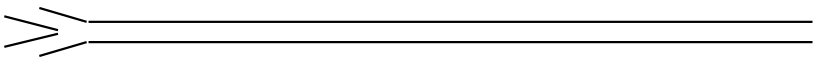
Appendix E



Equivalency Checklists

The *Checklist for Initial Demonstration of Method Performance, Checklist for Continuing Demonstration of Method Performance*, and *Certification Statement* (collectively called "Checklists") and instructions for their completion are provided in this appendix. The Checklists, as drafted by the Environmental Monitoring Management Council (EMMC), were developed for general application across all EPA programs. As a result, the Checklists contain several categories that are not relevant to Office of Water's methods approval program; these categories will be indicated by "NA" (not applicable). The EMMC instructions have been annotated to clarify each checklist item's applicability to the streamlined methods approval program. Annotated sections are highlighted within text boxes as shown in Figure E-1.

Streamlining:

Annotated instructions.

Figure E-50. Example Annotated Box

Checklist for Initial Demonstration of Method Performance

7/13/96

For the demonstration of equivalency, provide a checklist for each matrix in each medium.

Date: **Page __of __**
Laboratory Name & Address:
Facility Name:
Discharge Point ID:
EPA Program and Applicable Regulation:

Medium:
(e.g., wastewater, drinking water, soil, air, waste solid, leachate, sludge, other)

Analyte or Class of Analytes:
(e.g., barium, trace metals, benzene, volatile organics, etc.)

Initial Demonstration of Method Performance *(1)*				
Category	**Performance Criteria** *(2)* **Based on** **Measurement Method**	**Reference Quality Objective**	**Results Obtained**	**Perf. Spec. Achieved (✓)**
1. Written method (addressing all elements in the EMMC format) attached				
2. Title, number and date/rev. of "reference method", if applicable ***(3)***				
3. Copy of the reference method, if applicable, maintained at facility				
4. Differences between PBM and reference method (if applicable) attached				
5. Concentrations of calibration standards				
6. %RSD or correlation coefficient of calibration regression				
7. Performance range tested (with units)				

Initial Demonstration of Method Performance *(1)*				
Category	**Performance Criteria *(2)* Based on**		**Results Obtained**	**Perf. Spec. Achieved (✓)**
	Measurement Quality Method	**Reference Objective**		
8. Sample(s) used in initial demonstration have recommended preservative, where applicable.				
9. Sample(s) used in initial demonstration met recommended holding times, where applicable				
10. Interferences				
11. Qualitative identification criteria used				
12. Performance Evaluation studies performed for analytes of interest, where available: Latest study sponsor and title: Latest study number:				
13. Analysis of external reference material				
14. Source of reference material				
15. Surrogates used, if applicable				
16. Concentrations of surrogates, if applicable				
17. Recoveries of surrogates appropriate to the proposed use, if applicable				
18. Sample preparation				
19. Clean-up procedures				
20. Method Blank Result				
21. Matrix (reagent water, drinking water, sand, waste solid, ambient air, etc.)				
22. Spiking system, appropriate to method and application				
23. Spike concentrations (w/ units corresponding to final sample concentration)				
24. Source of spiking material				
25. Number of replicate spikes				

Initial Demonstration of Method Performance *(1)*				
Category	**Performance Criteria** *(2)* **Based on**		**Results Obtained**	**Perf. Spec. Achieved (✓)**
	Measurement Quality Method	**Reference Objective**		
26. Precision (analyte by analyte)				
27. Bias (analyte by analyte)				
28. Detection Limit (w/ units; analyte by analyte)				
29. Confirmation of Detection Limit, if applicable				
30. Quantitation Limit (w/ units: analyte by analyte)				
31. Qualitative Confirmation				
32. Frequency of performance of the Initial Demonstration				
33. Other criterion (specify)				
34. Other criterion (specify)				

[1] Provide a detailed narrative description of the initial demonstration.

[2] For multi-analyte methods, enter "see attachment" and attach a list or table containing the analyte-specific performance criteria from the reference method or those needed to satisfy measurement quality objectives.

[3] If a reference method is the source of the performance criteria, the reference method should be appropriate to the required application, and the listed criteria should be fully consistent with that reference method.

Name and signature of each analyst involved in the initial demonstration of method performance (includes all steps in the proposed method/modification):

_____ _____ _____

Name **Signature** **Date**

_____ _____ _____

Name **Signature** **Date**

_____	_____	_____
Name	**Signature**	**Date**

The certification above must accompany this form each time it is submitted.

Checklist for Continuing Demonstration of Method Performance

7/13/96

For the demonstration of equivalency, provide a checklist for each matrix in each medium.

Date: **Page __of __**
Laboratory Name & Address:
Facility Name:
Discharge Point ID:
EPA Program and Applicable Regulation:

Medium:
(e.g., wastewater, drinking water, soil, air, waste solid, leachate, sludge, other)

Analyte or Class of Analytes:
(e.g., barium, trace metals, benzene, volatile organics, etc.)

Continuing Demonstration of Method Performance				
Category	**Required Frequency**	**Specific Perf. Criteria**	**Results Obtained**	**Perf. Spec. Achieved (✓)**
1. Method blank result (taken through all steps in the procedure)				
2. Concentrations of calibration standards used to verify working range (with units), where applicable				
3. Calibration verification				
4. Laboratory Control Sample				
5. External QC sample (where available)				
6. Performance evaluation (PE) studies, if applicable Latest study sponsor and title: Latest study number:				
7. List analytes for which results were "not acceptable" in PE study	----	----	----	----
8. Surrogates used, if applicable				
9. Concentration of surrogates, if applicable				
10. Recovery of surrogates (acceptance range for multi-analyte methods), if applicable				
11. Matrix				
12. Matrix spike compounds				

Continuing Demonstration of Method Performance				
Category	**Required Frequency**	**Specific Perf. Criteria**	**Results Obtained**	**Perf. Spec. Achieved (✓)**
13. Concentration of matrix spike compounds				
14. Recoveries of matrix spike compounds				
14a. Recoveries of matrix spike duplicate compounds				
15. Qualitative identification criteria used				
16. Precision (analyte by analyte)				
17. Other category (specify)				
18. Other category (specify)				

Name and signature of each analyst involved in continuing demonstration of method performance (includes all steps in the proposed method/modification):

_____ _____ _____

Name **Signature** **Date**

_____ _____ _____

Name **Signature** **Date**

_____ _____ _____

Name **Signature** **Date**

The certification above must accompany this form each time it is submitted.

Certification Statement

7/13/96

Date: **Page __of __**
Laboratory Name & Address:
Facility Name:
Discharge Point ID:
EPA Program and Applicable Regulation:

Medium:
(e.g., water, soil, air)

Analyte or Class of Analytes:
(e.g., barium, trace metals, benzene, volatile organics, etc.; Attach separate list, as needed.)

We, the undersigned, CERTIFY that:

1. The method(s) in use at this facility for the analysis/analyses of samples for the programs of the U.S. Environmental Protection Agency have met the Initial and any required Continuing Demonstration of Method Performance Criteria specified by EPA.

2. A copy of the method used to perform these analyses, written in EMMC format, and copies of the reference method and laboratory-specific SOPs are available for all personnel on-site.

3. The data and checklists associated with the initial and continuing demonstration of method performance are true, accurate, complete and self-explanatory[1].

4. All raw data (including a copy of this certification form) necessary to reconstruct and validate these performance related analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized inspectors.

_____ _____

Facility Manager's Name and Title **Signature** **Date**

_____ _____

Quality Assurance Officer's Name **Signature** **Date**

This certification form must be completed when the method is originally certified, each time a continuing demonstration of method performance is documented, and whenever a change of personnel involves the Facility Manager or the Quality Assurance Officer.

[1] True: Consistent with supporting data.

Accurate: Based on good laboratory practices consistent with sound scientific principles/practices.

Complete: Includes the results of all supporting performance testing.

Self-Explanatory: Data properly labeled and stored so that the results are clear and require no additional explanation.

EMMC Checklists Instructions

Checklists Overview:

The Checklists were arrived at through consensus among EPA's programs by developing performance "categories" that allow use of the same Checklists across the Agency's various programs/projects. The Checklists may be applied to screening and field techniques as well as laboratory procedures.

Implementation of the Checklists is program-specific and a category that does not apply within a given EPA program will be indicated by NA (not applicable). Criteria for a specific EPA program are to be filled in under the "Performance Criteria" column; e.g., an Office of Water Reference Method may specify 20% RSD or a correlation coefficient of 0.995 for the category that specifies calibration linearity, whereas an Office of Solid Waste Project may specify a Measurement Quality Objective of 12% RSD or a correlation coefficient of 0.998 for this category.

For each EPA program, the Checklists are to be completed for each matrix within each medium for all matrices and media to which an alternate method or method modification applies.

Streamlining:

EMMC's definition of media is equivalent to Streamlining's matrix type.

Each completed Checklist must be retained on file at the laboratory that uses the performance-based method (PBM) or method modification and at the regulated facility from which samples are collected, and must be submitted to the appropriate Regulatory Authority upon request to support analysis of those samples to which the PBM or modified method was applied.

Streamlining:

Under the streamlining, the term "new method" is used in place of PBM.

Header:

Each page of the checklist contains six lines of header information, consisting of:

* **Date** (enter the date that the checklist was completed--Program/Project implementation plans should indicate whether the checklist must be submitted to the Regulatory Authority, as well as, retained on file at the laboratory and regulated facility).

* **Laboratory Name & Address** (If a commercial contract laboratory uses the method on behalf of one or more applicable clients, enter the name and address of the laboratory.)

* **Facility Name** (enter the name of the water treatment facility, system, or regulated facility or other program or project specified entity where the facility maintains an on-site analytical laboratory. If the method is being employed by a commercial contract laboratory on behalf of one or more applicable clients, enter the name of the laboratory followed by a listing of the appropriate clients).

Streamlining:

This field is optional. Identify the facility from which the matrix samples were taken.

* **Discharge Point Identification Number** (enter the discharge point identification number, if applicable).

* **EPA Program & Applicable Regulation**(enter the name of the Agency Program or Project to whom the results will be reported, or under the auspices of which the data are collected, e.g., "CAA" for Clean Air Act monitoring and "SDWA" for analyses associated with the Safe Drinking Water Act).

* **Medium** (enter the type of environmental sample, e.g., drinking water--NOTE a separate checklist should be prepared for each medium, e.g., for checklists associated with performance-based methods for SDWA, enter "Drinking Water" as the matrix type. As the evaluations of a performance-based method will involve matrix-specific performance measures, a separate checklist would be prepared for each matrix. The "medium is the environmental sample type to which the performance-based method applies, whereas the performance category "matrix", appearing in the body of the checklists refers to the specific sample type within the "Medium" that was spiked ,e.g., for "Medium" hazardous waste, the checklist category "Matrix" may be solvent waste.

Streamlining:

Enter the matrix instead of the medium.

* **Analyte or Class of Analytes** where available (As many methods apply to a large number of analytes, it is not practical to list every analyte in this field, as indicated on the form, the class of analytes may be specified here, i.e., volatile organics. However, if such a classification is used, a separate list of analytes and their respective Chemical Abstract Service Registry Numbers (CAS #) must be attached to the checklist).

Initial Demonstration of Method Performance Checklist:

The Initial Demonstration of Method Performance involves multiple spikes into a defined sample matrix (e.g., wastewater medium, paper plant effluent matrix), to demonstrate that the Performance-based Method meets the Program or Project Performance Criteria based on the performance of established "Reference Method" or based on "Measurement Quality Objectives" (formerly called Data Quality Objectives). This exercise is patterned after the "Initial Demonstration of Capability" delineated in a number of the Agency's published methods (Reference Methods).

Footnote #1 indicates that a detailed narrative description of the initial demonstration procedure is to be provided.

Footnote #2 indicates that for multi-analyte methods, the range of performance criteria for the analytes may be entered, but an analyte-specific performance criteria is to be attached. ***In general, when using the checklists, if the criteria or performance are lengthy, attach as a separate sheet, and enter "see attached" for this item.***

Footnote #3 indicates that if a reference method is the source of the performance criteria, the reference method should be appropriate to the required application and the listed criteria should be fully consistent with that reference method. The reference method name and EPA number (where applicable) should be delineated in the program/project implementation plan, e.g., by the Program Office or the Project Officer/Manager.

There are 34 numbered entries in the body of the checklist--***NOTE: UNDER NORMAL CIRCUMSTANCES, IT WOULD NEVER BE ACCEPTABLE TO ANSWER "NO" TO ANY OF THESE PERFORMANCE CATEGORIES, OR FAIL TO ATTACH THE REQUESTED MATERIALS :***

Streamlining:

Categories which do not apply to streamlining method validation will be marked with "NA".

#1. <u>Written Method</u> (addressing all elements in the EMMC format)

The details of the method used for analysis must be described in a version of the method written in EMMC format. The EMMC method format includes the following: 1.0 Scope & Application; 2.0 Summary of Method; 3.0 Definitions; 4.0 Interferences; 5.0 Safety; 6.0 Equipment & Supplies; 7.0 Reagents & Standards; 8.0 Sample Collection, Preservation & Storage; 9.0 Quality Control; 10.0 Calibration & Standardization; 11.0 Procedures; 12.0 Data Analysis & Calculations; 13.0 Method Performance; 14.0 Pollution Prevention; 15.0 Waste

Management; 16.0 References; 17.0 Tables, Diagrams, Flowcharts & Validation Data. While this format may differ from that used in standard operation procedures (SOPs) in a given laboratory, the use of a consistent format is essential for the efficient and effective evaluation by inspectors, program and project managers/officers.

Streamlining:

See the *Guidelines and Format for Methods to be Proposed at 40 CFR Part 136 or Part 141* (EPA-821-B-96-003) for detailed guidance on method format.

#2. Title, Number and date/revision of "Reference Method" if applicable.

For Example Polychlorinated Dioxins and Furans, EPA Method 1613, Revision B, October, 1994.

#3. Copy of the reference method, if applicable, maintained at the facility.

A copy of the reference method must be kept available for all laboratory personnel, however, it need not be attached to the checklist itself.

#4. Differences between PBM and reference method attached.

The laboratory must summarize the differences between the reference method and the performance-based method and attach this summary to the checklist. This summary should focus on significant difference in techniques (e.g., changes beyond the flexibility allowed in the reference method), not minor deviations such as the glassware used.

#5. Concentrations of calibration standards.

The range of the concentrations of materials used to establish the relationship between the response of the measurement system and analyte concentration. This range must bracket any action, decision or regulatory limit. In addition, this range must include the concentration range for which sample results are measured and reported (when samples are measured after sample dilution/concentration).

#6. % RSD or Slope/Correlation Coefficient of Calibration Regression.

This performance category refers to quantitative measures describing the relationship between the amount of material introduced into the measurement system and the response of the system, e.g., analytical instrument. A ***linear response*** is generally expected and is typically measured as either a linear regression or inorganic analytes, or as the relative standard deviation (or coefficient of variation) of the response factors or calibration factors for organic

analytes. Traditional performance specifications considered any regression line with a correlation coefficient (r) of 0.995 or greater as linear. Also, for organic analytes, a relative standard deviation (RSD) of 25% or less is considered linear. The calibration relationship, however, is not necessarily limited to a linear relationship. However, it should be remembered if the Program/Project Office or Officer/Managers specifies other calibration relationships, e.g., quadratic fit, more calibration standards are generally necessary to accurately established the calibration. If applicable a ***calibration curve***, graphical representation of the instrument response versus the concentration of the calibration standards, should be attached.

#7. Performance Range Tested (with units).

This range must reflect the actual range of sample concentrations that were tested and must include the concentration units. Since the procedures may include routine sample dilution or concentration, the performance range may be broader than the range of the concentrations of the calibration standards.

#8. Samples(s) used in initial demonstration have recommended preservative, where applicable.

Unless preservation have been specifically evaluated, this entry should be taken directly from the reference method/standard. If preservation has been evaluated, include the study description and conclusions of that evaluation, with a reference to the specific study description. The data must be attached.

#9. Samples(s) used in the initial demonstration must be within the recommended holding times, where applicable.

Unless holding time (time from when a sample is collected until analysis) has been specifically evaluated, this entry should be taken directly from the reference method/standard. If holding time has been evaluated, include the study description and conclusions of that evaluation here, with a reference to the specific study description. The data must be attached.

#10. Interferences.

Enter information on any known or suspected interferences with the performance-based method. Such interferences are difficult to predict in many cases, but may be indicated by unacceptable spike recoveries in environmental matrices, especially when such recovery problems were not noted in testing a clean matrix such as reagent water. The inferences associated with the reference method are to be indicated, as well as, the affect of these interferences on the performance-base method.

#11. Qualitative identification criteria used.

Enter all relevant criteria used for identification, including such items as retention time, spectral wavelengths, ion abundance ratios. If the instrumental techniques for the Performance-based method are similar to the reference method, use the reference method as a guide when specifying identification criteria. If the list of criteria is lengthy, attach it on a separate sheet, and enter "see attached" for this item.

#12. Performance Evaluation Studies performed for analytes of interest, where available (last study sponsor and title:; last study number:).

Several EPA Programs conduct periodic performance evaluation (PE) studies. Organizations outside of the Agency also may conduct such studies. Enter the sponsor, title, and date of the most recent study in which the performance-based method was applied to the matrix of interest. ***For the performance-based method to be acceptable, the performance on such studies must be "fully successful", i.e., within the study QC acceptance criteria***.

#13. Analysis of external reference material.

Enter the results of analyses on reference material from a source different from that used to prepare calibration standards (where applicable). This performance category is especially important if Performance Evaluation Studies are not available for the analytes of interest.

Streamlining:

Analysis of a reference sample is one of streamlining's standardized QC elements. The most common reference sample is a Reference Material from the National Institute of Standards and Technology. EPA will provide further guidance on its streamlining reference sample program when EPA initiates its pilot study of the streamlined methods approval process.

#14. Source of reference material.

Enter criteria, if applicable, for traceability of materials used to verify the accuracy of the results, e.g., obtained from the National Institute of Science and Technology (NIST).

#15. Surrogates used if applicable.

Surrogates may be added to samples prior to preparation, as a test of the entire analytical procedure. These compounds are typically brominated, fluorinated or isotopically labeled compounds, with structural similarities to the analytes of interest. Also, they are not expected to be present in environmental samples. Surrogates are often used in the analysis for organic analytes. Enter the names of the surrogate compounds in this category.

#16. Concentrations of surrogates (if applicable).

Enter the concentration of surrogates once spiked into the sample (i.e., final concentration).

#17. Recoveries of Surrogates appropriate to the proposed use (if applicable).

Enter the summary of the surrogate recovery limits and attached a detailed listing if more space is needed.

#18. Sample Preparation.

Enter necessary preliminary treatments necessary, e.g., digestion, distillation and/or extraction. A detailed listing may be attached if more space is needed.

#19. Clean-up Procedures.

Enter necessary intermediatory steps necessary to prior to the determinative step (instrumental analysis), e.g., GPC, copper sulfate, alumina/Florisil treatment, etc.

#20. Method Blank Result.

A clean matrix (i.e., does not contain the analytes of interest) that is carried through the entire analytical procedure, including all sample handling, preparation, extraction, digestion, cleanup and instrumental procedures. The volume or weight of the blank should be the same as that used for sample analyses. The method blank is used to evaluate the levels of analytes that may be introduced into the samples as a result of background contamination in the laboratory. Enter the analyte/s and concentration measured in the blank.

#21. Matrix (reagent water, drinking water, soil, waste solid, air, etc.).

Refers to the specific sample type within the broader "Medium" that was spiked, e.g., for Medium": "Hazardous Waste" an example matrix spiked as part of the initial demonstration of method performance might be "solvent waste".

Streamlining:

Enter the same matrix as specified in the header.

#22. Spiking System, appropriate to the method and application.

Enter the procedure by which a known amount of analyte/s ("spike") was added to the sample matrix. This may include the solvent that is employed and the technique to be employed (e.g., permeation tube, or volumetric pipet delivery techniques spiked onto a soil sample and allowed to equilibrate 1 day, etc.). ***Solid matrices are often difficult to spike and considerable detailed narrative may be necessary to delineate the procedure. For spikes onto aqueous samples generally a water miscible solvent is specified.***

#23. Spike levels (w/units corresponding to final sample concentration).

Enter the amount of the analyte/s ("spike") that was added to the sample matrix in terms of the final concentration in the sample matrix.

Streamlining:

Under streamlining, initial spikes, also known as initial precision and recovery (IPR) standards, will be performed in reagent water. Using reagent water will allow the comparison of IPR spike recoveries determined with the modified method against IPR criteria specified in the reference method because reference method IPR specifications are developed from reagent water spikes.

#24. Source of spiking material.

Enter the organization or vendor from which the "spiking" material was obtained. This should include specific identification information, e.g., lot#, catalogue number, etc.

#25. Number of Replicate Spikes.

The initial demonstration of method performance involves the analyses of replicate spikes into a defined sample matrix category #21). Enter the number of such replicates. In general at least 4 replicates should be prepared and analyzed independently.

#26. Precision (analyte by analyte).

Precision is a measure of agreement among individual determinations. Statistical measures of precision include standard deviation, relative standard deviation or percent difference.

#27. Bias (analyte by analyte).

Bias refers to the systematic or persistent distortion of a measurement process which causes errors in one direction. Bias is often measured at the ratio of the measured value to the "true" value or nominal value. Bias is often (erroneously) used interchangeably with "accuracy", despite the fact that the two terms are complementary, that is, high "accuracy" implies low "bias", and vice versa. Enter the name of the Bias measure (% recovery,

difference from true, etc.), the numeric value with associated units for each analyte obtained for each analyte spiked in the initial demonstration procedure.

Streamlining:

Bias is not required under streamlining. This field is not applicable.

#28. Detection Limit (w/units; analyte by analyte).

A general term for the lowest concentration at which an analyte can be detected and identified. There are various measures of detection which include Limit of Detection and Method Detection Limit. Enter the detection measure (e.g., "MDL") and the analytical result with units for each analyte in the matrix (#21).

Streamlining:

For method modifications, enter the detection limits specified in the reference method. For new methods, enter the calculated detection limits.

#29. Confirmation of Detection Limit.

In addition to spikes into the matrix of interest (#21) it may be beneficial to perform the detection measurements in a clean matrix, e.g., laboratory pure water. Results of the spikes in the clean matrix are frequently available in the Agency's published methods. Determining MDLs in a clean matrix using the performance-based method will allow a comparison to the MDLs published in the Agency methods.

Also, the detection limit technique may specify specific procedures to verify that the obtained limit is correct, e.g., the "iterative process" detailed in the 40 CFR Part 136, Appendix B, MDL procedures.

#30. Quantitation Limit (w/ units; analyte by analyte).

The lowest concentration that the analyte can be reported with sufficient certainty that an unqualified numeric value is reportable. Measures of Quantitation limits include the Minimum Level (ML), Interim Minimum Level (IML), Practical Quantitation Level (PQL), and Limit of Quantitation (LOQ). Enter the measure of Quantitation limit, and the units for each analyte.

#31. Qualitative confirmation.

Enter all relevant criteria used for identification, including such items as: retention time; use of a second chromatographic column; use of second (different) analytical technique; spectral wavelengths; and ion abundance ratios. If the instrumental techniques for the modified method are similar to those of the reference method, use the reference method as a guide when specifying confirmation criteria. If the list of criteria is lengthy, attach it on a separate sheet, and enter "see attached" for this item.

#32. Frequency (initial Demonstration to be performed.

Enter the frequency that the initial demonstration has to be repeated, e.g., with each new instrument or once a year, which ever is more frequent.

#33-#34. Other Criteria.

Enter other necessary program/project specific method performance categories.

Streamlining:

Under streamlining Categories 33 and 34 are used as follows:

#33. Matrix Spike/Matrix Spike Duplicate.

Enter the percent recoveries of analytes spiked into the sample matrix. For method modifications, only one set of matrix spike/matrix spike duplicate (MS/MSD) samples. For new methods, two sets of MS/MSD samples must be analyzed to provide sufficient data for QC acceptance criteria development.

#34. Matrix Spike/Matrix Spike Duplicate Relative Percent Deviation.

Enter the calculated relative percent deviation between the MS and MSD analyte recoveries.

Signatures:

The name, signature and date of each analyst involved in the initial demonstration of method performance is to be provided at the bottom of the check sheet.

Continuing Demonstration of Capability Checklist:

The process by which a laboratory documents that their previously established performance of an analytical procedure continues to meet performance specifications as delineated in this checklist.

#1. Method Blank.

A clean matrix (i.e., does not contain the analytes of interest) that is carried through the entire analytical procedure, including all sample handling, preparation, extraction, digestion, cleanup and instrumental procedures. The volume or weight of the blank should be the same as that used for sample analyses. The method blank is used to evaluate the levels of analytes that may be introduced into the samples as a result of background contamination in the laboratory. Enter the analyte/s and concentration measured in the blank.

#2. Concentrations of calibration standards used to verify working range, where applicable (include units).

The range of the concentrations of materials used to confirm the established relationship between the response of the measurement system and analyte concentration. This range must bracket any action, decision or regulatory limit. In addition, this range must include the concentration range for which sample results are measured and reported (when samples are measured after sample dilution/concentration). Enter the concentrations of the calibration standards.

#3. Calibration Verification.

A means of confirming that the previously determined calibration relationship still holds. This process typically involves the analyses of two standards with concentrations which bracket the concentrations measured in the sample/s. Enter the procedure to be used to verify the calibration and the results obtained for each analyte.

#4. Calibration check standard.

A single analytical standard introduced into the instrument as a means of establishing that the previously determined calibration relationship still holds. Enter the concentrations and result for each analyte.

#5. External QC sample (where applicable).

Enter the results of analyses for reference material (e.g., Quality Control samples/ampules) from a source different from that used to prepare calibration standards (where applicable). Enter the concentration, as well as, the source of this material. This performance category is

of particular importance if Performance Evaluation studies are not available for the analytes of interest.

#6. Performance Evaluation studies performed for analytes of interest, where available (Last study sponsor and title:; Last study number:).

Several EPA Programs conduct periodic performance evaluation (PE) studies. Other organizations, outside of the Agency, also conduct such studies. Enter the sponsor, title, and date of the most recent study in which the performance-based method was applied to the matrix of interest. ***For the Performance-based method to be acceptable the performance on such studies must be "fully successful", i.e., within the study QC acceptance criteria.***

 # 7. List of analytes for which results were "not acceptable" in PE study.

#8. Surrogate Compounds used. if applicable.

Surrogates may be added to samples prior to preparation, as a test of the entire analytical procedure. These compounds are typically brominated, fluorinated or isotopically labeled compounds, with structural similarities to the analytes of interest. They are compounds not expected to be present in environmental samples. Surrogates are often used in analyses for organic analytes. Enter the names of the surrogate compounds in this performance category.

#9. Concentration of surrogates (if applicable).

Enter the concentration of surrogates once spiked into the sample (i.e., final concentration), with units.

#10. Recoveries of Surrogates appropriate to the proposed use (if applicable).

Enter the summary of the surrogate recovery limits and attached a detailed listing (each surrogate compound), if more space is needed.

#11. Matrix (reagent water, drinking water, soil, waste solid, air, etc.).

Refers to the specific sample type within the broader "Medium" that was spiked, e.g., for "Medium": "Hazardous Waste" an example "matrix", spiked as part of the initial demonstration of method performance, might be "solvent waste".

#12. Matrix Spike Compounds.

In preparing a matrix spike a known amount of analyte is added to an aliquot of a real-world sample matrix. This aliquot is analyzed to help evaluate the effects of the sample matrix on the analytical procedure. Matrix spike results are typically used to calculate recovery of analytes as a measure of bias for that matrix. Enter the analytes spiked.

#13. Matrix Spike Concentrations (w/units corresponding to final sample concentration).

Enter the amount of the analyte/s ("spike") that was added to the sample matrix in terms of the final concentration in the sample matrix.

#14. Recovery of Matrix Spike (w/units).

The ratio of the standard deviation of a series of at least three measurements to the mean of the measurements. This value is often expressed as a percentage of the mean.

Note: Some programs/projects have utilized matrix spike duplicates (a separate duplicate of the matrix spike) to help verify the matrix spike result and to provide precision data for analytes which are not frequently found in real-world samples, i.e., duplication of non-detects provides little information concerning the precision of the method.

#15. **Qualitative identification criteria used**.

Enter all relevant criteria used for identification, including such items as retention times, spectral wavelengths, ion abundance ratios. If the instrumental techniques for the Performance-based method are similar to the reference method, use the reference method as a guide when specifying identification criteria. If the list of criteria is lengthy, attach it on a separate sheet, and enter "see attached" for this item.

#16. Sample Preparation.

Enter necessary preliminary treatments necessary, e.g., digestion, distillation and/or extraction. A detailed listing may be attached if more space is needed.

#17. Clean-up Procedures.

Enter necessary intermediatory steps necessary to prior to the determinative step (instrumental analysis), e.g., GPC, copper sulfate, alumina/forisil treatment, etc.

#18. Confirmation.

Qualitative identification criteria used. Enter all relevant criteria used for identification, including such items as: retention time; use of second chromatographic column; use of second (different) analytical technique; spectral wavelengths, ion abundance rations. If the instrumental techniques for the Performance-based method are similar to the reference method, use the reference method as a guide when specifying confirmation criteria. If the list of criteria is lengthy, attach it on a separate sheet, and enter "see attached" for this item.

#19-20. Other.

Enter other necessary program/project specific method performance categories.

Signatures:

The name, signature and date of each analyst involved in the continuing demonstration of method performance is to be provided at the bottom of the checklist.

This section provides an example of completed checklists and associated laboratory data. The data were obtained from a contract laboratory's testing of Method 1613, "Tetra- Through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS". Method 1613 is approved for use in drinking water at 40 CFR 141.24 (59 FR 62468), and proposed for use in wastewater (56 FR 62468) and the Pulp, Paper, and Paperboard category at 40 CFR part 430 (58 CFR 66078).

The information is technically detailed, and intended for data reviewers familiar with analytical methods. This example is provided to serve as an additional form of guidance for completing the checklists.

Checklist for Initial Demonstration of Method Performance

7/13/96

For the demonstration of equivalency, provide a checklist for each matrix in each medium.

Date: ***February 2, 1994*** **Page __of __**
Laboratory Name & Address: ***ABC Analytical, Inc., Anytown, USA***
Facility Name: ***Paper Mill #1***
Discharge Point ID: ***N/A***
EPA Program and Applicable Regulation: ***CWA Effluent Guidelines***

Medium: ***Water***
(e.g., water, soil, air)

Analyte or Class of Analytes: ***Polychlorinated Dioxins and Furans***
(e.g., barium, trace metals, benzene, volatile organics, etc.; Attach separate list, as needed.)

Initial Demonstration of Method Performance *(1)*				
Category	**Performance Criteria** *(2)* **Based on** **Measurement Quality Method**	**Reference Objective**	**Results Obtained**	**Perf. Spec. Achieved (✓)**
1. Written method (addressing all elements in the EMMC format) attached				✔
2. Title, number and date/rev. of "reference method", if applicable ***(3)***			*EPA Method 1613 Rev. B*	✔
3. Copy of the reference method, if applicable, maintained at facility				✔
4. Differences between the modified and reference method (if applicable) attached				*N/A*
5. Concentrations of calibration standards	*Attach 1*		*Attach 1*	✔
6. %RSD or correlation coefficient of calibration regression	*Attach 2*		*Attach 2*	✔
7. Performance range tested (with units)	*Attach 3*		*Attach 3*	✔
8. Sample(s) used in initial demonstration have recommended preservative, where applicable.				*N/A*

Initial Demonstration of Method Performance *(1)*				
Category	**Performance Criteria *(2)* Based on**		**Results Obtained**	**Perf. Spec. Achieved (✓)**
	Measurement Quality Method	**Reference Objective**		
9. Samples(s) used in initial demonstration met recommended holding times, where applicable				✔
10. Interferences	*Attach 4*		*Attach 4*	✔
11. Qualitative identification criteria used	*Attach 5*		*Attach 5*	✔
12. Performance Evaluation studies performed for analytes of interest, where available: Latest study sponsor and title: Latest study number:			*John Doe, PE Study, 1234*	✔
13. Analysis of external reference material				*N/A*
14. Source of reference material				*N/A*
15. Surrogates used, if applicable	*Attach 6 & 8*		*Attach 6 & 8*	✔
16. Concentrations of surrogates, if applicable	*Attach 6 & 8*		*Attach 6 & 8*	✔
17. Recoveries of surrogates appropriate to the proposed use, if applicable	*Attach 6 & 8*		*Attach 6 & 8*	✔
18. Sample preparation	*Extraction*		*Extraction*	✔
19. Clean-up procedures				*N/A*
20. Method Blank Result	*Attach 8*		*Attach 8*	✔
21. Matrix (reagent water, drinking water, waste solid, etc.)			*Paper Mill Effluent*	✔
22. Spiking system, appropriate to method and application	*volumetric pipet*		*volumetric pipet*	✔
23. Spike concentrations (w/ units corresponding to final sample concentration)	*Attach 6*		*Attach 6*	✔

Initial Demonstration of Method Performance *(1)*				
Category	**Performance Criteria** *(2)* **Based on** **Measurement Quality Objective**	**Reference Method**	**Results Obtained**	**Perf. Spec. Achieved (✓)**
24. Source of spiking material			*Acme Standards lot #105 cat #41*	✔
25. Number of replicate spikes	*at least four*		*four*	✔
26. Precision (analyte by analyte)	*Attach 7*		*Attach 7*	✔
27. Bias (analyte by analyte)				*N/A*
28. Detection Limit (w/ units; analyte by analyte)				*N/A*
29. Confirmation of Detection Limit, if applicable				*N/A*
30. Quantitation Limit (w/ units: analyte by analyte)	*Attach 9*		*Attach 9*	✔
31. Qualitative Confirmation	*Attach 5*		*Attach 5*	✔
32. Frequency of performance of the Initial Demonstration	*Annual*		*Annual*	✔
33. Other criterion (specify)				*N/A*
34. Other criterion (specify)				*N/A*

[1] Provide a detailed narrative description of the initial demonstration.

[2] For multi-analyte methods, enter "see attachment" and attach a list or table containing the analyte-specific performance criteria from the reference method or those needed to satisfy measurement quality objectives.

[3] If a reference method is the source of the performance criteria, the reference method should be appropriate to the required application, and the listed criteria should be fully consistent with that reference method.

Name and signature of each analyst involved in the initial demonstration of method performance (includes all steps in the proposed method/modification):

John Doe _____ **2/2/94**
Name **Signature** **Date**

_____ _____ _____
Name **Signature** **Date**

_____	_____	_____
Name	**Signature**	**Date**

The certification above must accompany this form each time it is submitted.

Certification Statement

Date: *February 2, 1994* **Page _1 of _1**
Laboratory Name & Address: *ABC Analytical, Inc., Anytown, USA*
Facility Name: *Paper Mill #1*
Discharge Point ID: *N/A*
EPA Program and Applicable Regulation: *CWA Effluent Guidelines*

Medium: *Water*
(e.g., water, soil, air)

Analyte or Class of Analytes: *Polychlorinated Dioxins and Furans*
(e.g., barium, trace metals, benzene, volatile organics, etc.; Attach separate list, as needed.)

We, the undersigned, CERTIFY that:

1. The method(s) in use at this facility for the analysis/analyses of samples for the programs of the U.S. Environmental Protection Agency have met the Initial and any required Continuing Demonstration of Method Performance Criteria specified by EPA.

2. A copy of the method used to perform these analyses, written in EMMC format, and copies of the reference method and laboratory-specific SOPs are available for all personnel on-site.

3. The data and checklists associated with the initial and continuing demonstration of method performance are true, accurate, complete and self-explanatory (1).

4. All raw data (including a copy of this certification form) necessary to reconstruct and validate these performance related analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized inspectors.

Jane Doe, Laboratory Manager _____ *2/2/94*
Facility Manager's Name and Title Signature Date

John Doe, Chemist _____ *2/2/94*
Quality Assurance Officer's Name Signature Date

This certification form must be completed when the method is originally certified, each time a continuing demonstration of method performance is documented, and whenever a change of personnel involves the Facility Manager or the Quality Assurance Officer.

(1) True: Consistent with supporting data.

Accurate: Based on good laboratory practices consistent with sound scientific principles/practices.

Complete: Includes the results of all supporting performance testing.

Self-Explanatory: Data properly labeled and stored so that the results are clear and require no additional explanation.

Attachment 1
Concentration(s) of Calibration Solution(s)

Compound	Specification in Reference Method					Result Obtained
	CS1 (ng/mL)	CS2 (ng/mL)	CS3 (ng/mL)	CS4 (ng/mL)	CS5 (ng/mL)	(Concentrations Used)
2,3,7,8-TCDD	0.5	2	10	40	200	Same
2,3,7,8-TCDF	0.5	2	10	40	200	Same
1,2,3,7,8-PeCDD	2.5	10	50	200	1000	Same
1,2,3,7,8-PeCDF	2.5	10	50	200	1000	Same
2,3,4,7,8-PeCDF	2.5	10	50	200	1000	Same
1,2,3,4,7,8-HxCDD	2.5	10	50	200	1000	Same
1,2,3,6,7,8-HxCDD	2.5	10	50	200	1000	Same
1,2,3,7,8,9-HxCDD	2.5	10	50	200	1000	Same
1,2,3,4,7,8-HxCDF	2.5	10	50	200	1000	Same
1,2,3,6,7,8-HxCDF	2.5	10	50	200	1000	Same
1,2,3,7,8,9-HxCDF	2.5	10	50	200	1000	Same
2,3,4,6,7,8-HxCDF	2.5	10	50	200	1000	Same
1,2,3,4,6,7,8-HpCDD	2.5	10	50	200	1000	Same
1,2,3,4,6,7,8-HpCDF	2.5	10	50	200	1000	Same
1,2,3,4,7,8,9-HpCDF	2.5	10	50	200	1000	Same
OCDD	5.0	20	100	400	2000	Same
OCDF	5.0	20	100	400	2000	Same
$^{13}C_{12}$-2,3,7,8-TCDD	100	100	100	100	100	Same
$^{13}C_{12}$-2,3,7,8-TCDF	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	100	100	100	100	Same
$^{13}C_{12}$-2,3,4,7,8-PeCDF	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	100	100	100	100	100	Same
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	100	100	100	100	100	Same
$^{13}C_{12}$-OCDD	200	200	200	200	200	Same
Cleanup Standard						
$^{37}Cl_4$-2,3,7,8-TCDD	0.5	2	10	40	200	Same
Internal Standards						
$^{13}C_{12}$-1,2,3,4-TCDD	100	100	100	100	100	Same
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	100	100	100	100	100	Same

Attachment 2
Percent Relative Standard Deviation (%RSD)

Compound	Specification in Reference Method (%)	Result Obtained (%)
2,3,7,8-TCDD	< 20	4.5
2,3,7,8-TCDF	< 20	7.3
1,2,3,7,8-PeCDD	< 20	3.6
1,2,3,7,8-PeCDF	< 20	2.7
2,3,4,7,8-PeCDF	< 20	2.8
1,2,3,4,7,8-HxCDD	< 20	5.5
1,2,3,6,7,8-HxCDD	< 20	2.0
1,2,3,7,8,9-HxCDD	< 20	2.8
1,2,3,4,7,8-HxCDF	< 20	1.6
1,2,3,6,7,8-HxCDF	< 20	3.0
1,2,3,7,8,9-HxCDF	< 20	4.4
2,3,4,6,7,8-HxCDF	< 20	5.4
1,2,3,4,6,7,8-HpCDD	< 20	5.6
1,2,3,4,6,7,8-HpCDF	< 20	4.1
1,2,3,4,7,8,9-HpCDF	< 20	3.4
OCDD	< 20	2.5
OCDF	< 20	1.9
$^{13}C_{12}$-2,3,7,8-TCDD	< 35	2.0
$^{13}C_{12}$-2,3,7,8-TCDF	< 35	3.0
$^{13}C_{12}$-1,2,3,7,8-PeCDD	< 35	5.1
$^{13}C_{12}$-1,2,3,7,8-PeCDF	< 35	6.8
$^{13}C_{12}$-2,3,4,7,8-PeCDF	< 35	6.1
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	< 35	8.1
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	< 35	1.7
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	< 35	7.8
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	< 35	3.3
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	< 35	8.9
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	< 35	4.8
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	< 35	5.0
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	< 35	4.9
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	< 35	8.3
$^{13}C_{12}$-OCDD	< 35	9.3
Cleanup Standard		
$^{37}Cl_4$-2,3,7,8-TCDD	< 35	15

Attachment 3
Performance Range

Compound	Specification in Reference Method (pg/L)	Result Obtained (pg/L)
2,3,7,8-TCDD	10 - 4000	10 - 4000
2,3,7,8-TCDF	10 - 4000	10 - 4000
1,2,3,7,8-PeCDD	50 - 20,000	50 - 20,000
1,2,3,7,8-PeCDF	50 - 20,000	50 - 20,000
2,3,4,7,8-PeCDF	50 - 20,000	50 - 20,000
1,2,3,4,7,8-HxCDD	50 - 20,000	50 - 20,000
1,2,3,6,7,8-HxCDD	50 - 20,000	50 - 20,000
1,2,3,7,8,9-HxCDD	50 - 20,000	50 - 20,000
1,2,3,4,7,8-HxCDF	50 - 20,000	50 - 20,000
1,2,3,6,7,8-HxCDF	50 - 20,000	50 - 20,000
1,2,3,7,8,9-HxCDF	50 - 20,000	50 - 20,000
2,3,4,6,7,8-HxCDF	50 - 20,000	50 - 20,000
1,2,3,4,6,7,8-HpCDD	50 - 20,000	50 - 20,000
1,2,3,4,6,7,8-HpCDF	50 - 20,000	50 - 20,000
1,2,3,4,7,8,9-HpCDF	50 - 20,000	50 - 20,000
OCDD	100 - 40,000	100 - 40,000
OCDF	100 - 40,000	100 - 40,000

Attachment 4
Specificity in Presence of Interferences

Compound	Specification in Reference Method (%)	Result Obtained (%)
1,2,3,4-TCDD	The height of the valley between the most closely eluted isomers and the 2,3,-7,8- isomers is less than 25 percent.	0
1,2,7,8-TCDD		0
1,4,7,8-TCDD		0
1,2,3,7-TCDD		0
1,2,3,8-TCDD		0
2,3,7,8-TCDD		0

Attachment 5
Qualitative Identification Criteria

Criteria	Specification in Reference Method (%)	Specification Achieved (Y/N)
Mass-to-charge ratios (m/z's)	The signals for the two exact m/z's being monitored must be present and must maximize within ± 2 seconds of one another.	Y
Signal-to-noise ratios	The signal-to-noise ratio of each of the two exact m/z's must be greater than or equal to 2.5 for sample extracts and greater than or equal to 10 for calibration standards.	Y
Ion abundance ratios	The ratio of the integrated ion currents for the two exact m/z's being monitored must be within the limits of the table below.	Y

Theoretical Ion Abundance Ratios and QC Limits

Number of Chlorine Atoms	m/z's Forming Ratio	Theoretical Ratio	QC Limits (1)	
			Lower	Upper
4 (2)	M/M+2	0.77	0.65	0.89
5	M+2/M+4	1.55	1.32	1.78
6	M+2/M+4	1.24	1.05	1.43
6 (3)	M/M+2	0.51	0.43	0.59
7	M+2/M+4	1.05	0.88	1.20
7 (4)	M/M+2	0.44	0.37	0.51
8	M+2/M+4	0.89	0.76	1.02

(1) QC limits represent ± 15% windows around the theoretical ion abundance ratios.

(2) Does not apply to $^{37}Cl_4$-2,3,7,8-TCDD (cleanup standard).

(3) Used for $^{13}C_{12}$-HxCDF only.

(4) Used for $^{13}C_{12}$-HpCDF only.

Attachment 6

IPR Spike Levels, Surrogates Used, and Surrogate Recovery Limits

Compound	Spike Level (1) (ng/mL)	Concentration Found IPR-1 (ng/mL)	IPR-2 (ng/mL)	IPR-3 (ng/mL)	IPR-4 (ng/mL)
2,3,7,8-TCDD	10	9.5	9.9	9.9	10.0
2,3,7,8-TCDF	10	9.5	10.0	9.7	10.0
1,2,3,7,8-PeCDD	50	46.7	48.4	49.0	48.3
1,2,3,7,8-PeCDF	50	46.4	48.7	49.2	49.0
2,3,4,7,8-PeCDF	50	47.7	48.7	49.5	50.5
1,2,3,4,7,8-HxCDD	50	45.6	47.2	48.0	49.8
1,2,3,6,7,8-HxCDD	50	48.3	51.9	52.2	50.3
1,2,3,7,8,9-HxCDD	50	52.4	53.7	57.3	54.3
1,2,3,4,7,8-HxCDF	50	49.6	50.0	49.7	49.9
1,2,3,6,7,8-HxCDF	50	49.4	52.6	52.7	54.1
1,2,3,7,8,9-HxCDF	50	46.0	48.0	48.8	48.1
2,3,4,6,7,8-HxCDF	50	47.5	50.4	50.1	48.4
1,2,3,4,6,7,8-HpCDD	50	49.5	54.5	55.2	51.9
1,2,3,4,6,7,8-HpCDF	50	46.3	49.4	50.4	49.9
1,2,3,4,7,8,9-HpCDF	50	48.1	51.0	52.3	49.6
OCDD	100	98.4	115.9	106.4	107.0
OCDF	100	84.9	89.2	97.2	92.8
$^{13}C_{12}$-2,3,7,8-TCDD	100	77.6	80.2	83.6	82.7
$^{13}C_{12}$-2,3,7,8-TCDF	100	78.1	79.9	81.3	79.2
$^{13}C_{12}$-1,2,3,7,8-PeCDD	100	69.7	66.2	70.0	69.7
$^{13}C_{12}$-1,2,3,7,8-PeCDF	100	68.7	69.5	71.8	70.6
$^{13}C_{12}$-2,3,4,7,8-PeCDF	100	67.0	66.9	67.8	65.1
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	100	108.4	106.3	108.9	108.3
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	100	77.3	80.1	78.8	85.0
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	100	54.8	57.8	80.8	70.7
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	100	49.6	53.9	71.9	62.6
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	100	77.4	82.2	82.3	89.1
$^{13}C_{12}$-2,3,4,6,7,8,-HxCDF	100	96.1	98.4	103.7	112.9
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	100	81.2	78.4	80.4	89.1
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	100	52.2	50.9	71.7	64.5
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	100	85.9	85.1	88.9	97.2
$^{13}C_{12}$-OCDD	200	133.1	120.3	132.6	146.2
$^{37}Cl_4$-2,3,7,8-TCDD	10	8.4	8.0	8.0	7.7

Note: The shaded compounds are the surrogates (labeled compounds) required by the reference method. The labeled compound recovery limits are 25 - 150%.

ALL NATIVE AND LABELED COMPOUNDS REQUIRED BY THE METHOD WERE SPIKED AT THE APPROPRIATE LEVEL.

Attachment 7
IPR Precision and Recovery Limits

Compound	Specification in Reference Method (1) s (ng/mL)	Specification in Reference Method (1) X (ng/mL)	Specification in Reference Method (1) s (ng/mL)	Specification in Reference Method (1) X (ng/mL)
2,3,7,8-TCDD	1.1	8.0 - 12.5	0.2	9.8
2,3,7,8-TCDF	0.5	8.2 - 12.8	0.2	9.8
1,2,3,7,8-PeCDD	1.5	44.2 - 53.1	1.0	48.1
1,2,3,7,8-PeCDF	1.5	44.1 - 55.2	1.3	48.3
2,3,4,7,8-PeCDF	3.4	45.7 - 58.7	1.2	49.1
1,2,3,4,7,8-HxCDD	5.3	40.6 - 64.6	1.7	47.6
1,2,3,6,7,8-HxCDD	3.7	47.5 - 50.6	1.8	50.7
1,2,3,7,8,9-HxCDD	5.6	35.6 - 73.9	2.1	54.4
1,2,3,4,7,8-HxCDF	3.7	41.7 - 54.5	0.2	49.8
1,2,3,6,7,8-HxCDF	1.9	47.0 - 54.2	1.9	52.2
1,2,3,7,8,9-HxCDF	3.6	46.6 - 54.0	1.2	47.7
2,3,4,6,7,8-HxCDF	2.2	44.8 - 52.8	1.4	49.1
1,2,3,4,6,7,8-HpCDD	3.3	39.6 - 58.0	2.6	52.8
1,2,3,4,6,7,8-HpCDF	2.6	43.9 - 55.4	1.8	49.0
1,2,3,4,7,8,9-HpCDF	2.9	49.5 - 52.1	1.8	50.2
OCDD	11.3	73.8 - 149.1	7.2	106.9
OCDF	5.8	74.0 - 128.7	5.2	91.0
$^{13}C_{12}$-2,3,7,8-TCDD	16.0	25.0 - 150.0	2.7	81.0
$^{13}C_{12}$-2,3,7,8-TCDF	18.4	25.0 - 150.0	1.3	79.6
$^{13}C_{12}$-1,2,3,7,8-PeCDD	21.2	25.0 - 150.0	1.8	68.9
$^{13}C_{12}$-1,2,3,7,8-PeCDF	15.9	25.0 - 150.0	1.3	70.2
$^{13}C_{12}$-2,3,4,7,8-PeCDF	20.1	25.0 - 150.0	1.1	66.7
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	18.7	25.0 - 150.0	1.1	108.0
$^{13}C_{12}$-1,2,3,6,7,8,-HxCDD	24.1	25.0 - 150.0	3.3	80.3
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	14.5	25.0 - 150.0	12.0	66.0
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	11.5	25.0 - 150.0	9.9	59.5
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	14.8	25.0 - 150.0	4.8	82.8
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	10.4	25.0 - 150.0	7.5	102.8
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	20.4	25.0 - 150.0	4.7	82.3
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	18.8	25.0 - 150.0	10.0	59.8
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	22.9	25.0 - 150.0	5.5	89.3
$^{13}C_{12}$-OCDD	43.9	50.0 - 300.0	10.6	133.0
$^{37}Cl_4$-2,3,7,8-TCDD	-	2.5 - 15.0	-	8.0

(1) s = standard deviation of the concentration, X = average concentration.

Attachment 8
Method Blank

Compound	Specification in Reference Method (1)	Result Obtained
	pg/L	pg/L
2,3,7,8-TCDD	< 10	< 10
2,3,7,8-TCDF	< 10	< 10
1,2,3,7,8-PeCDD	< 50	< 50
1,2,3,7,8-PeCDF	< 50	< 50
2,3,4,7,8-PeCDF	< 50	< 50
1,2,3,4,7,8-HxCDD	< 50	< 50
1,2,3,6,7,8-HxCDD	< 50	< 50
1,2,3,7,8,9-HxCDD	< 50	< 50
1,2,3,4,7,8-HxCDF	< 50	< 50
1,2,3,6,7,8-HxCDF	< 50	< 50
1,2,3,7,8,9-HxCDF	< 50	< 50
2,3,4,6,7,8-HxCDF	< 50	< 50
1,2,3,4,6,7,8-HpCDD	< 50	< 50
1,2,3,4,6,7,8-HpCDF	< 50	< 50
1,2,3,4,7,8,9-HpCDF	< 50	< 50
OCDD	< 100	< 100
OCDF	< 100	< 100
	% Recovery	% Recovery
$^{13}C_{12}$-2,3,7,8-TCDD	25 - 150	76
$^{13}C_{12}$-2,3,7,8-TCDF	25 - 150	72
$^{13}C_{12}$-1,2,3,7,8-PeCDD	25 - 150	65
$^{13}C_{12}$-1,2,3,7,8-PeCDF	25 - 150	67
$^{13}C_{12}$-2,3,4,7,8-PeCDF	25 - 150	61
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	25 - 150	92
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	25 - 150	86
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	25 - 150	68
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	25 - 150	58
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	25 - 150	104
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	25 - 150	75
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	25 - 150	82
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	25 - 150	69
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	25 - 150	93
$^{13}C_{12}$-OCDD	25 - 150	73
Cleanup Standard		
$^{37}Cl_4$-2,3,7,8-TCDD	25 - 150	94

(1) For native analytes, the concentration found must be below the Minimum Level for that analyte.
For labeled compounds, the percent recovery must be within the limit of 25 - 150%.

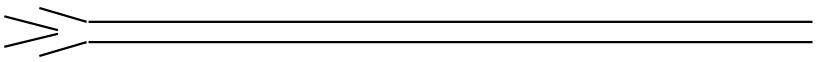
Note: **All labeled compounds were spiked at the same level as for the IPR requirements.**

Attachment 9
Minimum Levels

Compound	Specification in Reference Method (pg/L) (1)		Result Obtained
	Minimum Level (pg/L)	Signal-to-noise ratio	
2,3,7,8-TCDD	10	> 10	> 10
2,3,7,8-TCDF	10	> 10	> 10
1,2,3,7,8-PeCDD	50	> 10	> 10
1,2,3,7,8-PeCDF	50	> 10	> 10
2,3,4,7,8-PeCDF	50	> 10	> 10
1,2,3,4,7,8-HxCDD	50	> 10	> 10
1,2,3,6,7,8-HxCDD	50	> 10	> 10
1,2,3,7,8,9-HxCDD	50	> 10	> 10
1,2,3,4,7,8-HxCDF	50	> 10	> 10
1,2,3,6,7,8-HxCDF	50	> 10	> 10
1,2,3,7,8,9-HxCDF	50	> 10	> 10
2,3,4,6,7,8-HxCDF	50	> 10	> 10
1,2,3,4,6,7,8-HpCDD	50	> 10	> 10
1,2,3,4,6,7,8-HpCDF	50	> 10	> 10
1,2,3,4,7,8,9-HpCDF	50	> 10	> 10
OCDD	100	> 10	> 10
OCDF	100	> 10	> 10

(1) The peaks representing the native analytes in the CS1 calibration standard must have a signal-to-noise ratio greater than or equal to 10.

Appendix F



Inorganic Criteria

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data								Specs									
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
1.	Acidity (CaCO3)	305.1	---	1.00	Multi	MCAWW	2	---	---	---	---	3.6	---	---	---	---	3.6		10 mg/L	Range
2.	Alkalinity "	310.1	---	2.00	Multi	"	2	---	---	---	---	7.2	---	---	---	---	7.2		10 mg/L	310.2
	"	310.2	99.50	0.50	Single	"	2	---	100 mg/L	97.0	102.0	1.8	97.0	102.0	97.0	102.0	1.8		10 mg/L	Range
3.	Aluminum - Flame	202.1	99.13	31.60	Multi	Apx D	5	25 %	100 ug/L	35.0	163.0	64.0	29.0	169.0	29.0	169.0	64.0		300 ug/L	3.18 x DL
	" - Furnace	202.2	103.69	42.74	Multi	Apx D	5	25 %	100 ug/L	18.0	190.0	86.0	9.0	198.0	9.0	198.0	86.0		20 ug/L	Range
	" - ICP	200.7	96.33	24.19	Multi	Apx C	5	25 %	100 ug/L	47.0	145.0	49.0	43.0	150.0	43.0	150.0	49.0	20 ug/L	50 ug/L	3.18 x MDL
	" - DCP	---																		
	" - Color	---																		
4.	Ammonia - distill																			
	" - Nessler	350.2	100.46	14.27	Multi	MCAWW	3	10 %	2.0 mg/L	71.0	129.0	29.0	69.0	132.0	69.0	132.0	29.0		50 ug/L	Range
	" - Titr	350.2	100.46	14.27	Multi	MCAWW	3	10 %	2.0 mg/L	71.0	129.0	29.0	69.0	132.0	69.0	132.0	29.0		1.0 mg/L	Range
	" - ISE	350.3	91.00	2.31	Single	MCAWW	3	10 %	130 ug/L	82.0	100.0	8.4	81.0	101.0	81.0	101.0	8.4		30 ug/L	Range
	" - Phenate	350.1	103.00	1.16	Single	MCAWW	1	---	0.5 mg/L	98.0	108.0	4.2	98.0	108.0	98.0	108.0	4.2		10 ug/L	Range
	" - Auto elec	---																		
5.	Antimony - Flame	204.1	96.50	1.13	Single	MCAWW	1	---	10 mg/L	92.0	101.0	4.1	91.0	102.0	91.0	102.0	4.1		1.0 mg/L	Range
	Antimony - Furnace	204.2	71.20	38.17	Multi	Apx D	5	25 %	100 ug/L	d	148.0	77.0	d	156.0	d	156.0	77.0		20 ug/L	Range
	Antimony - ICP	200.7	76.00	15.44	Multi	Apx C	3	10 %	500 ug/L	45.0	107.0	31.0	42.0	110.0	42.0	110.0	31.0	8 ug/L	20 ug/L	3.18 x MDL
6.	Arsenic	206.5	Digestion - no specs																	
	" - Hydride	206.3	98.38	8.19	Single	3114 B	3	10 %	200 ug/L	68.0	128.0	30.0	65.0	132.0	65.0	132.0	30.0		2.0 ug/L	Range
	" - Furnace	206.2	98.63	15.98	Multi	Apx D	3	10 %	100 ug/L	66.0	131.0	32.0	63.0	134.0	63.0	134.0	32.0		5.0 ug/L	Range
	" - ICP	200.7	92.17	14.79	Multi	Apx C	3	10 %	100 ug/L	62.0	122.0	30.0	59.0	125.0	59.0	125.0	30.0	8 ug/L	20 ug/L	3.18 x MDL
	" - Color (SDDC)	206.4	100.00	13.80	Multi	MCAWW	3	10 %	40 ug/L	72.0	128.0	28.0	69.0	131.0	69.0	131.0	28.0		10 ug/L	Method
7.	Barium - Flame	208.1	103.50	8.63	Single	MCAWW	3	10 %	1 mg/L	72.0	135.0	32.0	69.0	138.0	69.0	138.0	32.0		1.0 mg/L	Range
	" - Furnace	208.2	142.14	31.10	Multi	Apx D	5	25 %	100 ug/L	79.0	205.0	63.0	73.0	211.0	73.0	211.0	63.0		10 ug/L	Range
	" - ICP	200.7	77.30	20.97	Multi	Apx C	3	10 %	100 ug/L	35.0	120.0	42.0	31.0	124.0	31.0	124.0	42.0	1 ug/L	2 ug/L	3.18 x MDL
	" - DCP	---																		

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
8.	Beryllium - Flame	210.1	98.33	4.27	Single	MCAWW	3	10 %	50 ug/L	82.0	114.0	16.0	81.0	116.0	81.0	116.0	16.0		50 ug/L	Range
	" - Furnace	210.2	106.66	21.76	Multi	Apx D	5	25 %	100 ug/L	63.0	151.0	44.0	58.0	155.0	58.0	155.0	44.0		1.0 mg/L	Range
	" - ICP	200.7	96.34	2.31	Multi	Apx C	3	10 %	100 ug/L	91.0	101.0	4.7	91.0	102.0	91.0	102.0	4.7	0.3 ug/L	1.0 ug/L	3.18 x MDL
	" - DCP	---																		
	" - Color	---																		
9.	BOD	405.1		24.10	Multi	MCAWW	---	---	100 mg/L			49.0					49.0		N/A	
10.	Boron - Color	212.3	100.00	22.80	Multi	MCAWW	5	25 %	240 ug/L	54.0	146.0	46.0	49.0	151.0	49.0	151.0	46.0		100 ug/L	Range
	" - ICP	200.7	97.07	25.60	Multi	Apx C	5	25 %	100 ug/L	45.0	149.0	52.0	40.0	154.0	40.0	154.0	52.0	3 ug/L	10 ug/L	3.18 x MDL
	" - DCP	---																		
11.	Bromide	320.1	93.75	7.17	Single	MCAWW	3	10 %	5 mg/L	67.0	120.0	26.0	65.0	123.0	65.0	123.0	26.0		2 mg/L	Range
12.	Cadmium - Flame	213.1	94.87	15.88	Multi	Apx D	3	10 %	100 ug/L	63.0	127.0	32.0	59.0	130.0	59.0	130.0	32.0		50 ug/L	Range
	Cadmium - Furnace	213.2	98.43	23.05	Multi	Apx D	5	25 %	100 ug/L	52.0	145.0	47.0	47.0	150.0	47.0	150.0	47.0		0.5 ug/L	Range
	Cadmium - ICP	200.7	98.56	7.59	Multi	Apx C	3	10 %	100 ug/L	83.0	114.0	16.0	81.0	116.0	81.0	116.0	16.0	1 ug/L	2 ug/L	3.18 x MDL
	Cadmium - DCP	---																		
	Cadmium - Volt	---																		
	Cadmium - Color	---																		
13.	Calcium - Flame	215.1	99.00	3.33	Single	MCAWW	3	10 %	10 ug/L	87.0	111.0	12.0	85.0	113.0	85.0	113.0	12.0		200 ug/L	Range
	Calcium - ICP	200.7	89.22	22.38	Multi	Apx C	5	25 %	100 ug/L	44.0	134.0	45.0	39.0	139.0	39.0	139.0	45.0	10 ug/L	20 ug/L	3.18 x MDL
	Calcium - DCP	---																		
	Calcium - Titr	215.2	98.10	9.20	Single	MCAWW	3	10 %	100 ug/L	64.0	132.0	34.0	61.0	135.0	61.0	135.0	34.0		2 mg/L	3.18 x LDL
14.	CBOD5	---																		
15.	COD - Titr	410.1	95.30	17.76	Multi	MCAWW	3	10 %	250 mg/L	59.0	131.0	36.0	56.0	135.0	56.0	135.0	36.0		50 mg/L	Method
	COD - Titr	410.2	100.30	4.15	Multi	MCAWW	3	10 %	10 mg/L	92.0	109.0	8.3	91.0	110.0	91.0	110.0	8.3		5 mg/L	Range
	COD - Titr	410.3	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0			
	COD - Spectro	410.4	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0			

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
16.	Chloride - Titr/Ag	---																		
	Chloride - Titr/Hg	325.3	97.10	3.30	Multi	MCAWW	3	10 %	250 mg/L	90.0	104.0	6.6	89.0	105.0	89.0	105.0	6.6		---	
	Chloride - Color	---																		
	Chloride - Auto	325.1	100.50	3.00	Single	MCAWW	3	10 %	10 mg/L	89.0	112.0	11.0	88.0	113.0	88.0	113.0	11.0		1 mg/L	Range
	Chloride - Auto	325.2	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 mg/L	Range
17.	Chlorine - Ampere	330.1	91.20	12.50	Multi	MCAWW	3	10 %	250 mg/L	66.0	117.0	25.0	63.0	119.0	63.0	119.0	25.0		---	
	Chlorine - Iodo	330.3	81.50	32.40	Multi	MCAWW	5	25 %	1.0 mg/L	16.0	147.0	65.0	10.0	153.0	10.0	153.0	65.0		0.1 mg/L	Method
	Chlorine - Back titr	330.2	98.80	4.30	Single	MCAWW	3	10 %	1.0 mg/L	83.0	115.0	16.0	81.0	116.0	81.0	116.0	16.0		---	
	Chlorine - DPD-FAS	330.4	91.90	19.20	Multi	MCAWW	3	10 %	1.0 mg/L	53.0	131.0	39.0	49.0	135.0	49.0	135.0	39.0		0.1 mg/L	Method
	Chlorine - Spectro	330.5	84.40	27.60	Multi	MCAWW	5	25 %	1.0 mg/L	29.0	140.0	56.0	23.0	146.0	23.0	146.0	56.0		0.2 mg/L	Method
	Chlorine - Electrode	---																		
18.	Chromium VI - AA	218.4	98.49	6.96	Multi	MCAWW	3	10 %	100 ug/L	84.0	113.0	14.0	83.0	114.0	83.0	114.0	14.0		10 ug/L	Range
	Chromium VI - Color	---																		
19.	Chromium - Flame	218.1	101.54	17.36	Multi	Apx D	3	10 %	100 ug/L	66.0	137.0	35.0	63.0	140.0	63.0	140.0	35.0		250 ug/L	Method
	Chromium - Chelate	218.3	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 ug/L	Method
	Chromium - Furnace	218.2	91.43	17.69	Multi	Apx D	3	10 %	100 ug/L	56.0	127.0	36.0	52.0	131.0	52.0	131.0	36.0		5 ug/L	Range
	Chromium - ICP	200.7	98.54	9.39	Multi	Apx C	3	10 %	100 ug/L	79.0	118.0	19.0	77.0	120.0	77.0	120.0	19.0	4 ug/L	10 ug/L	3.18 x MDL
	Chromium - DCP	---																		
	Chromium - Color	---																		
20.	Cobalt - Flame	219.1	98.00	1.00	Single	MCAWW	3	10 %	1.0 mg/L	94.0	102.0	3.6	94.0	102.0	94.0	102.0	3.6		500 ug/L	Range
	Cobalt - Furnace	219.2	89.38	22.27	Multi	Apx D	5	25 %	100 ug/L	44.0	134.0	45.0	40.0	139.0	40.0	139.0	45.0		5 ug/L	Range
	Cobalt - ICP	200.7	87.59	8.16	Multi	Apx C	3	10 %	100 ug/L	71.0	104.0	17.0	69.0	106.0	69.0	106.0	17.0	2 ug/L	5 ug/L	3.18 x MDL
	Cobalt - DCP	---																		

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
21.	Color - ADMI	110.1	100.00	10.00	No data	Default	1	---	100 C.U.	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		25 C.U.	Range
	Color - Pt/Co	110.2	100.00	10.00	No data	Default	3	---	100 C.U.	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		---	No data
	Color - Spectro	110.3	100.00	10.00	No data	Default	3	---	100 C.U.	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0			
22.	Copper - Flame	220.1	99.79	17.00	Multi	MCAWW	3	10 %	100 ug/L	65.0	134.0	34.0	62.0	138.0	62.0	138.0	34.0		100 ug/L	Method
	Copper - Furnace	220.2	92.54	27.29	Multi	Apx D	5	25 %	100 ug/L	37.0	148.0	55.0	32.0	153.0	32.0	153.0	55.0		5 ug/L	Range
	Copper - ICP	200.7	95.82	7.07	Multi	Apx C	3	10 %	100 ug/L	81.0	110.0	15.0	80.0	112.0	80.0	112.0	15.0	3 ug/L	10 ug/L	3.18 x MDL
	Copper - DCP	---																		
	Copper - Color/Neo	---																		
	Copper - Color/Bicin	---																		
23.	Cyanide - Distill	---																		
	Cyanide - Titr	---																		
	Cyanide - Spectro	335.2	85.00	11.07	Single	MCAWW	3	10 %	250 ug/L	45.0	125.0	40.0	40.0	130.0	40.0	130.0	40.0		60 ug/L	Data
	Cyanide - Auto	335.3	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		5 ug/L	Range
24.	CATC - Titr	335.1	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0			
	CATC - Spectro	335.1	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0			
25.	Fluoride - Distill	---																		
	Fluoride - Elec/man	340.2	98.82	3.53	Multi	MCAWW	3	10 %	1.0 mg/L	91.0	106.0	7.1	91.0	107.0	91.0	107.0	7.1		100 ug/L	Range
	Fluoride - Elec/auto	---																		
	Fluoride - SPADNS	340.1	97.59	10.72	Multi	MCAWW	3	10 %	1.0 mg/L	76.0	120.0	22.0	74.0	122.0	74.0	122.0	22.0		100 ug/L	Range
	Fluoride - Auto	340.3	89.00	12.00	Single	MCAWW	3	10 %	150 ug/L	45.0	133.0	44.0	41.0	137.0	41.0	137.0	44.0		50 ug/L	Range
26.	Gold - Flame	231.1	100.00	10.00	No data	Default	3	10 %	1.0 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		500 ug/L	Range
	Gold - Furnace	231.2	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		5 ug/L	Range

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	Gold - DCP	---																		
27.	Hardness - Color/auto	130.1	89.00	7.89	Single	MCAWW	3	10 %	50 mg/L	60.0	118.0	29.0	57.0	121.0	57.0	121.0	29.0		10 mg/L	Range
	Hardness - Titr/EDTA	130.2	99.13	9.26	Multi	MCAWW	3	10 %	30 mg/L	80.0	118.0	19.0	78.0	120.0	78.0	120.0	19.0		50 mg/L	Data
28.	pH - Electrode	150.1	N/A	1.30	Multi	MCAWW	2	---	N/A			2.6					2.6		N/A	
	pH - Auto	---																		
29.	Iridium - Flame	235.1	100.00	10.00	No data	Default	3	10 %	100 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		20 mg/L	Range
	Iridium - Furnace	235.2	100.00	10.00	No data	Default	3	10 %	200 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		100 ug/L	Range
30.	Iron - Flame	236.1	97.69	17.00	Multi	Apx D	3	10 %	100 ug/L	63.0	132.0	34.0	60.0	136.0	60.0	136.0	34.0		300 ug/L	Range
	Iron - Furnace	236.2	144.71	36.03	Multi	Apx D	5	25 %	100 ug/L	72.0	217.0	73.0	65.0	224.0	65.0	224.0	73.0		5 ug/L	Range
	Iron - ICP	200.7	95.29	18.33	Multi	Apx C	3	10 %	100 ug/L	58.0	132.0	37.0	54.0	136.0	54.0	136.0	37.0	30 ug/L	100 ug/L	3.18 x MDL
	Iron - DCP	---																		
	Iron - Color	---																		
31.	TKN - Digest	351.3	101.03	25.76	Multi	MCAWW	5	25 %	2 mg/L	49.0	153.0	52.0	44.0	158.0	44.0	158.0	52.0		50 ug/L	Range
	TKN - Titr	351.3	101.03	25.76	Multi	MCAWW	5	25 %	2 mg/L	49.0	153.0	52.0	44.0	158.0	44.0	158.0	52.0		50 ug/L	Range
	TKN - Nessler	351.3	101.03	25.76	Multi	MCAWW	5	25 %	2 mg/L	49.0	153.0	52.0	44.0	158.0	44.0	158.0	52.0		50 ug/L	Range
	TKN - Electrode	351.3	101.03	25.76	Multi	MCAWW	5	25 %	2 mg/L	49.0	153.0	52.0	44.0	158.0	44.0	158.0	52.0		50 ug/L	Range
	TKN - Phenate	351.1	71.70	27.98	Multi	MCAWW	5	25 %	2 mg/L	15.0	128.0	56.0	10.0	134.0	10.0	134.0	56.0		50 ug/L	Range
	TKN - Block/color	351.2	99.00	8.82	Single	MCAWW	3	10 %	2 mg/L	67.0	131.0	32.0	63.0	135.0	63.0	135.0	32.0		100 ug/L	Range
	TKN - Potentio	351.4	100.00	10.00	No data	Default	3	10 %	10 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		30 ug/L	Range
32.	Lead - Flame	239.1	109.90	36.70	Multi	Apx D	5	25 %	100 ug/L	36.0	184.0	74.0	29.0	191.0	29.0	191.0	74.0		40 ug/L	Data
	Lead - Furnace	239.2	93.80	22.75	Multi	Apx D	5	25 %	100 ug/L	48.0	140.0	46.0	43.0	144.0	43.0	144.0	46.0		5 ug/L	Range
	Lead - ICP	200.7	94.79	12.58	Multi	Apx C	3	10 %	100 ug/L	69.0	120.0	26.0	67.0	123.0	67.0	123.0	26.0	10 ug/L	20 ug/L	3.18 x MDL
	Lead - DCP	---																		
	Lead - Volt	---																		

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	Lead - Color	---																		
33.	Magnesium - Flame	242.1	97.90	29.81	Multi	MCAWW	5	25 %	100 ug/L	38.0	158.0	60.0	32.0	164.0	32.0	164.0	60.0		20 ug/L	Range
	Magnesium - ICP	200.7	97.71	17.67	Multi	Apx C	3	10 %	100 ug/L	62.0	134.0	36.0	58.0	137.0	58.0	137.0	36.0	20 ug/L	50 ug/L	3.18 x MDL
	Magnesium - DCP	---																		
	Magnesium - Grav	---																		
34.	Manganese - Flame	243.1	95.43	13.15	Multi	Apx D	3	25 %	100 ug/L	69.0	122.0	27.0	66.0	125.0	66.0	125.0	27.0		100 ug/L	Range
	Manganese - Furnace	243.2	106.20	21.05	Multi	Apx D	5	25 %	100 ug/L	64.0	149.0	43.0	59.0	153.0	59.0	153.0	43.0		1 ug/L	Range
	Manganese - ICP	200.7	94.30	4.12	Multi	Apx C	3	10 %	100 ug/L	86.0	103.0	8.3	85.0	104.0	85.0	104.0	8.3	1 ug/L	2 ug/L	3.18 x MDL
	Manganese - DCP	---																		
	Manganese - Persulf	---																		
	Manganese - Perioda	---																		
35.	Mercury - CV/Man	245.1	92.90	29.40	Multi	MCAWW	5	25 %	4 ug/L	34.0	152.0	59.0	28.0	158.0	28.0	158.0	59.0		0.2 ug/L	DL
	Mercury - CV/Auto	245.2	102.00	2.00	Single	MCAWW	3	10 %	10 ug/L	94.0	110.0	7.2	94.0	110.0	94.0	110.0	7.2		0.2 ug/L	DL
36.	Molybdenum - Flame	246.1	97.00	2.33	Single	MCAWW	3	10 %	300 ug/L	88.0	106.0	8.4	87.0	107.0	87.0	107.0	8.4		300 ug/L	Data
	Molybdenum - Furnace	246.2	100.00	10.00	No data	Default	3	10 %	10 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		3 ug/L	Range
	Molybdenum - ICP	200.7	96.92	7.78	Multi	Apx C	3	10 %	100 ug/L	81.0	113.0	16.0	79.0	115.0	79.0	115.0	16.0	4 ug/L	10 ug/L	3.18 x MDL
	Molybdenum - DCP	---																		
37.	Nickel - Flame	249.1	96.67	2.00	Single	MCAWW	3	10 %	1 ug/L	89.0	104.0	7.2	88.0	105.0	88.0	105.0	7.2		0.2 ug/L	Data
	Nickel - Furnace	249.2	90.37	26.65	Multi	Apx D	5	25 %	100 ug/L	37.0	144.0	54.0	31.0	149.0	31.0	149.0	54.0		5 ug/L	Range
	Nickel - ICP	200.7	95.48	10.44	Multi	Apx C	3	10 %	100 ug/L	74.0	117.0	21.0	72.0	119.0	72.0	119.0	21.0	5 ug/L	20 ug/L	3.18 x MDL
	Nickel - DCP	---																		
	Nickel - Color	---																		
38.	Nitrate	352.1	104.12	22.69	Multi	MCAWW	5	25 %	1 mg/L	58.0	150.0	46.0	54.0	155.0	54.0	155.0	46.0		0.1 mg/L	Range
39.	NO2-NO3 - Cd/Man	353.3	100.00	12.50	Single	MCAWW	3	10 %	40 ug/L	55.0	145.0	45.0	50.0	150.0	50.0	150.0	45.0		10 ug/L	Range
	NO2-NO3 - Cd/Auto	353.2	105.75	4.14	Single	MCAWW	3	10 %	290 ug/L	90.0	121.0	15.0	89.0	123.0	89.0	123.0	15.0		50 ug/L	Range

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	NO2-NO3 - Cd/Hydra	353.1	99.00	5.13	Single	MCAWW	3	10 %	400 ug/L	80.0	118.0	19.0	78.0	120.0	78.0	120.0	19.0		10 ug/L	Range
40.	Nitrite - Spec/Man	354.1	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		10 ug/L	Range
	Nitrite - Spec/Auto	---																		
41.	Oil & Grease	413.1	93.00	6.43	Single	MCAWW	1	10 %	15 mg/L	69.0	117.0	24.0	67.0	119.0	67.0	119.0	24.0		5 mg/L	Range
42.	TOC	415.1	101.01	7.78	Multi	MCAWW	3	10 %	100 mg/L	85.0	117.0	16.0	83.0	119.0	83.0	119.0	16.0		1 mg/L	Method
43.	Organic nitrogen	---																		
44.	O-phosphate - Auto	365.1	87.20	22.00	Multi	MCAWW	5	25 %	300 ug/L	43.0	132.0	45.0	38.0	136.0	38.0	136.0	45.0		10 ug/L	Range
	O-phosphate - Man 1	365.2	97.25	5.37	Multi	MCAWW	3	10 %	300 ug/L	86.0	108.0	11.0	85.0	110.0	85.0	110.0	11.0		10 ug/L	Range
	O-phosphate - Man 2	365.3	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		10 ug/L	Range
45.	Osmium - Flame	252.1	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 mg/L	Method
	Osmium - Furnace	252.2	100.00	10.00	No data	Default	3	10 %	10 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		50 ug/L	Range
46.	DO - Winkler	360.2	100.00	1.00	Single	MCAWW	3	10 %	1 mg/L	96.0	104.0	3.6	96.0	104.0	96.0	104.0	3.6		50 ug/L	Range
	DO - Electrode	360.1	100.00	1.00	Single	MCAWW	3	10 %	1 mg/L	96.0	104.0	3.6	96.0	104.0	96.0	104.0	3.6		50 ug/L	Range
47.	Palladium - Flame	253.1	100.00	10.00	No data	Default	3	10 %	1 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		500 ug/L	Range
	Palladium - Furnace	253.2	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		20 ug/L	Range
	Palladium - DCP	---																		
48.	Phenol - Color/Man	420.1	100.00	10.31	Multi	MCAWW	3	10 %	300 ug/L	79.0	121.0	21.0	77.0	123.0	77.0	123.0	21.0		5 ug/L	Method
	Phenol - Color/Auto	420.2	98.00	1.12	Single	MCAWW	3	10 %	1 mg/L	93.0	103.0	4.1	93.0	103.0	93.0	103.0	4.1		2 ug/L	Range
49.	Phosphorus - GC	---																		
50.	Phosphorus - Asc/Man	365.2	103.09	30.00	Multi	MCAWW	5	25 %	300 ug/L	43.0	164.0	60.0	37.0	170.0	37.0	170.0	60.0		10 ug/L	Range

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
										IPR			OPR		MS/MSD				
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	Phosphorus - Asc/Man	365.3	99.00	22.00	Multi	MCAW W	5	25 %	300 ug/L	55.0	143.0	44.0	50.0	148.0	50.0	148.0	44.0		10 ug/L	Range
	Phosphorus - Asc/Auto	365.1	87.20	22.00	Multi	MCAW W	5	25 %	300 ug/L	43.0	132.0	45.0	38.0	136.0	38.0	136.0	45.0		10 ug/L	Range
	Phosphorus - Block	365.4	98.00	3.00	Single	MCAW W	3	10 %	2 mg/L	87.0	109.0	11.0	86.0	110.0	86.0	110.0	11.0		10 ug/L	Range
51.	Platinum - Flame	255.1	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		5 mg/L	Range
	Platinum - Furnace	255.2	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		100 ug/L	Range
	Platinum - DCP	---																		
52.	Potassium - Flame	258.1	103.00	12.50	Single	MCAW W	3	10 %	2 mg/L	58.0	148.0	45.0	53.0	153.0	53.0	153.0	45.0		100 ug/L	Range
	Potassium - ICP	200.7	83.05	17.12	Multi	Apx C	3	10 %	1 mg/L	48.0	118.0	35.0	45.0	121.0	45.0	121.0	35.0	300 ug/L	1 mg/L	3.18 x MDL
	Potassium - FPD	---																		
	Potassium - Color	---																		
53.	Total Solids	160.3	100.00	10.00	No data	Default	1	---	100 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		10 mg/L	Range
54.	TDS	160.1	100.00	10.00	No data	Default	1	---	100 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		10 mg/L	Range
55.	TSS	160.2	100.00	10.00	No data	Default	1	---	100 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		4 mg/L	Range
56.	Settleable Solids	160.5	100.00	10.00	No data	Default	1	---	100 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		0.2 mL/L/h	Method
57.	Volatile Residue	160.4	100.00	6.47	Multi	MCAW W	3	10 %	300 ug/L	87.0	113.0	13.0	85.0	115.0	85.0	115.0	13.0		10 mg/L	Range
58.	Rhodium - Flame	265.1	100.00	10.00	No data	Default	3	10 %	1 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 mg/L	Range
	Rhodium - Furnace	265.2	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		20 ug/L	Range
59.	Ruthenium - Flame	267.1	100.00	10.00	No data	Default	3	10 %	1 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 mg/L	Range
	Ruthenium - Furnace	267.2	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		100 ug/L	Range
60.	Selenium - Furnace	270.2	96.12	16.72	Multi	Apx D	3	10 %	100 ug/L	62.0	130.0	34.0	59.0	133.0	59.0	133.0	34.0		5 ug/L	Range
	Selenium - ICP	200.7	91.13	26.35	Multi	Apx C	5	25 %	1 mg/L	38.0	144.0	53.0	33.0	150.0	33.0	150.0	53.0	20 ug/L	50 ug/L	3.18 x MDL

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	Selenium - Hydride	---																		
61.	Silica - Color/Man	370.1	85.70	7.80	Multi	MCAWW	3	10 %	5 mg/L	70.0	102.0	16.0	68.0	103.0	68.0	103.0	16.0		2 mg/L	Range
	Silica - Color/Auto	---																		
	Silica - ICP	200.7	53.86	45.38	Multi	Apx C	5	25 %	1 mg/L	d	145.0	91.0	d	154.0	d	154.0	91.0	20 ug/L	50 ug/L	3.18 x MDL
62.	Silver - Flame	272.1	89.40	17.60	Multi	MCAWW	3	10 %	50 ug/L	54.0	125.0	36.0	50.0	129.0	50.0	129.0	36.0		100 ug/L	Range
	Silver - Furnace	272.2	94.88	18.20	Multi	Apx D	3	10 %	100 ug/L	58.0	132.0	37.0	54.0	135.0	54.0	135.0	37.0		1 ug/L	Range
	Silver - ICP	200.7	49.73	47.50	Multi	Apx C	5	25 %	100 ug/L	d	145.0	95.0	d	155.0	d	155.0	95.0	2 ug/L	5 ug/L	3.18 x MDL
	Silver - DCP	---																		
63.	Sodium - Flame	273.1	100.00	1.54	Multi	MCAWW	3	10 %	5 mg/L	96.0	104.0	3.1	96.0	104.0	96.0	104.0	3.1		30 ug/L	Range
	Sodium - ICP	200.7	99.77	24.27	Multi	Apx C	5	25 %	1 mg/L	51.0	149.0	49.0	46.0	154.0	46.0	154.0	49.0	30 ug/L	100 ug/L	3.18 x MDL
	Sodium - DCP	---																		
	Sodium - FPD	---																		
64.	Specific conductance	120.1	97.98	7.55	Multi	MCAWW	3	10 %	5 mg/L	82.0	114.0	16.0	81.0	115.0	81.0	115.0	16.0		No data	
65.	Sulfate - Color/Auto	375.1	99.00	1.80	Single	MCAWW	3	10 %	100 mg/L	92.0	106.0	6.5	91.0	107.0	91.0	107.0	6.5		10 mg/L	Range
	Sulfate - Grav	375.3	102.00	1.45	Single	MCAWW	3	10 %	100 mg/L	96.0	108.0	5.3	96.0	108.0	96.0	108.0	5.3		10 ug/L	Range
	Sulfate - Turbid	375.4	96.99	7.15	Multi	MCAWW	3	10 %	100 mg/L	82.0	112.0	15.0	81.0	113.0	81.0	113.0	15.0		1 mg/L	DL
66.	Sulfide - Turbid	376.1	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 mg/L	DL
	Sulfide - Color	376.2	100.00	10.00	No data	MCAWW	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		No data	
67.	Sulfite - Turbid	377.1	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		3 mg/L	DL
68.	Surfactants	425.1	101.36	9.13	Multi	MCAWW	3	10 %	3 mg/L	83.0	120.0	19.0	81.0	122.0	81.0	122.0	19.0		25 ug/L	Range
69.	Temperature	170.1	---	---															N/A	
70.	Thallium - Flame	279.1	100.00	3.00	Single	MCAWW	3	10 %	600 ug/L	89.0	111.0	11.0	88.0	112.0	88.0	112.0	11.0		600 ug/L	Data
	Thallium - Furnace	279.2	87.10	11.79	Multi	Apx D	5	25 %	100 ug/L	63.0	111.0	24.0	61.0	114.0	61.0	114.0	24.0		5 ug/L	Range
	Thallium - ICP	200.7	82.90	28.34	Multi	Apx C	5	25 %	1 mg/L	26.0	140.0	57.0	20.0	146.0	20.0	146.0	57.0	20 ug/L	50 ug/L	3.18 x MDL

Table IF- Standardized QC and QC Acceptance Criteria for Methods in 40 CFR Part 136, Table IB

		Data							Specs										
									IPR			OPR		MS/MSD					
		Reference		Prec-				Spike	Recovery		Prec-	Recovery		Recovery				ML	ML
No.	Analyte	Method	Recovery	ision	Labs	Source	CAL points	CAL lin	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
71.	Tin - Flame	282.1	96.00	6.25	Single	MCAWW	3	10 %	4 mg/L	73.0	119.0	23.0	71.0	121.0	71.0	121.0	23.0		10 mg/L	Range
	Tin - Furnace	282.2	100.00	10.00	No data	Default	3	10 %	10 mg/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		20 ug/L	Range
	Tin - ICP	200.7	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0	7 ug/L	20 ug/L	3.18 x MDL
72.	Titanium - Flame	283.1	97.00	3.50	Single	MCAWW	3	10 %	2 mg/L	84.0	110.0	13.0	83.0	111.0	83.0	111.0	13.0		2 mg/L	Data
	Titanium - Furnace	283.2	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		50 ug/L	Range
	Titanium - ICP	200.7	100.00	10.00	No data	Default	3	10 %	100 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		1 ug/L	Range
73.	Turbidity	180.1	100.00	2.31	Single	MCAWW	3	10 %	25 NTU	91.0	109.0	8.4	90.0	110.0	90.0	110.0	8.4		0.05 NTU	Est
74.	Vanadium - Flame	286.1	100.00	5.00	Single	MCAWW	3	10 %	2 mg/L	82.0	118.0	18.0	80.0	120.0	80.0	120.0	18.0		2 mg/L	Range
	Vanadium - Furnace	286.2	85.11	32.80	Multi	Apx D	5	25 %	100 ug/L	19.0	151.0	66.0	12.0	158.0	12.0	158.0	66.0		10 ug/L	Range
	Vanadium - ICP	200.7	94.15	7.88	Multi	Apx C	3	10 %	100 ug/L	78.0	110.0	16.0	76.0	112.0	76.0	112.0	16.0	3 ug/L	10 ug/L	3.18 x MDL
	Vanadium - DCP	---																		
	Vanadium - Color	---																		
75.	Zinc - Flame	289.1	99.93	18.60	Multi	Apx D	3	10 %	100 mg/L	62.0	138.0	38.0	59.0	141.0	59.0	141.0	38.0		50 ug/L	Range
	Zinc - Furnace	289.2	168.59	67.06	Multi	Apx D	7	25 %	100 ug/L	34.0	303.0	135.0	21.0	317.0	21.0	317.0	140.0		0.2 ug/L	Range
	Zinc - ICP	200.7	93.26	12.89	Multi	Apx C	5	25 %	100 ug/L	67.0	120.0	26.0	64.0	122.0	64.0	122.0	26.0	2 ug/L	5 ug/L	3.18 x MDL
	Zinc - DCP	---																		
	Zinc - Color/Dithiz	---																		
	Zinc - Color/Zincon	---																		

Standardized QC and QC Acceptance Criteria for Methods in 40 CFR 141.23(k)(1)

		Data					Specs					IPR			OPR		MS/MSD					
		Reference		Prec-			CAL		MCL	Spike	Recovery		Prec-	Recover y		Recover y			ML	ML	
No.	Analyte	Method	Recover y	ision	Labs	Source	Point s	Lin	(ug/L)	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
1.	Alkalinity - Titr/Man	---																			
	Alkalinity - Titr/Auto	---																			
2.	Antimony - Furnace	---							6.0												
	Antimony - Hydride	---							6.0												
	Antimony - ICP/MS	200.8	98.8	8.067	Multi	Tbl 12	3	10 %	6.0	6 ug/L	82.0	115.0	17.0	81.0	117.0	81.0	117.0	17.0	0.4 ug/L	1 ug/L	3.18 x MDL
	Antimony - STGFAA	200.9	95.4	2.8	Single	Tbl IE	3	10 %	6.0	20 ug/L	85.0	106.0	11.0	84.0	107.0	84.0	107.0	11.0	0.8 ug/L	2 ug/L	3.18 x MDL
3.	Arsenic - Furnace	---							50												
	Arsenic - Hydride	---							50												
	Arsenic - ICP	200.7	98.27	13.59	Multi	Apx C	3	10 %	50	200 ug/L	71.0	126.0	28.0	68.0	129.0	68.0	129.0	28.0	53 ug/L	200 ug/L	3.18 x MDL
	Arsenic - ICP/MS	200.8	100.44	6.9	Multi	Tbl 12	3	10 %	50	50 ug/L	86.0	115.0	14.0	85.0	116.0	85.0	116.0	14.0	1.4 ug/L	5 ug/L	3.18 x MDL
	Arsenic - STGFAA	200.9	88.4	10	Single	Tbl IE	3	10 %	50	10 ug/L	52.0	125.0	36.0	48.0	129.0	48.0	129.0	36.0	0.5 ug/L	2 ug/L	3.18 x MDL
4.	Asbestos - TEM	100.1							7 MFL												
	Asbestos - TEM	100.2							7 MFL												
5.	Barium - Flame	---							2000												
	Barium - Furnace	---							2000												
	Barium - ICP	200.7	76.88	18.47	Multi	Apx C	3	10 %	2000	1 mg/L	39.0	114.0	37.0	36.0	118.0	36.0	118.0	37.0	2 ug/L	5 ug/L	3.18 x MDL
	Barium - ICP/MS	200.8	96.31	4.55	Multi	Tbl 12	3	10 %	2000	1 mg/L	87.0	106.0	9.1	86.0	107.0	86.0	107.0	9.1	0.8 ug/L	2.0 ug/L	3.18 x MDL
6.	Beryllium - Flame	---							4.0												
	Beryllium - ICP	200.7	97.54	25.11	Multi	Apx C	3	10 %	4.0	4 ug/L	47.0	148.0	51.0	42.0	153.0	42.0	153.0	51.0	0.3 ug/L	1 ug/L	3.18 x MDL
	Beryllium - ICP/MS	200.8	110.50	12.70	Multi	Tbl 12	3	10 %	4.0	4 ug/L	85.0	136.0	26.0	82.0	139.0	82.0	139.0	26.0	0.3 ug/L	1 ug/L	3.18 x MDL
	Beryllium - STGFAA	200.9	106	9.4	Single	Tbl IE	3	10 %	4.0	2.5 ug/L	72.0	140.0	34.0	68.0	144.0	68.0	144.0	34.0	0.02 ug/L	0.05 ug/L	3.18 x MDL
7.	Cadmium - Furnace	---							5.0												
	Cadmium - ICP	200.7	95.14	45.97	Multi	Apx C	3	10 %	5.0	5 ug/L	3.0	188.0	92.0	d	197.0	d	197.0	92.0	4 ug/L	10 ug/L	3.18 x MDL
	Cadmium - ICP/MS	200.8	100.5	16.1	Multi	Tbl 12	3	10 %	5.0	5 ug/L	68.0	133.0	33.0	65.0	136.0	65.0	136.0	33.0	0.5 ug/L	2 ug/L	3.18 x MDL
	Cadmium - STGFAA	200.9	105.2	6.3	Single	Tbl IE	3	10 %	5.0	0.5 ug/L	82.0	128.0	23.0	80.0	131.0	80.0	131.0	23.0	0.05 ug/L	0.2 ug/L	3.18 x MDL
8.	Calcium - Flame	---							---												
	Calcium - ICP	200.7	89.22	22.38	Multi	Apx C	3	10 %	---	100 ug/L	44.0	134.0	45.0	39.0	139.0	39.0	139.0	45.0	10 ug/L	20 ug/L	3.18 x MDL
	Calcium - Titr	---							---												

Standardized QC and QC Acceptance Criteria for Methods in 40 CFR 141.23(k)(1)

		Data					Specs					IPR			OPR		MS/MSD					
		Reference		Prec-			CAL		MCL	Spike	Recovery		Prec-	Recover y		Recover y			ML	ML	
No.	Analyte	Method	Recover y	ision	Labs	Source	Point s	Lin	(ug/L)	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
9.	Chromium - Furnace	---							100												
	Chromium - ICP	200.7	98.54	9.39	Multi	Apx C	3	10 %	100	100 ug/L	79.0	118.0	19.0	77.0	120.0	77.0	120.0	19.0	7 ug/L	20 ug/L	3.18 x MDL
	Chromium - ICP/MS	200.8	100.45	3.69	Multi	Tbl 12	3	10 %	100	100 ug/L	93.0	108.0	7.4	92.0	109.0	92.0	109.0	7.4	0.9 ug/L	2 ug/L	3.18 x MDL
	Chromium - STGFAA	200.9	105.7	3.1	Single	Tbl IE	3	10 %	100	2.5 ug/L	94.0	117.0	12.0	93.0	119.0	93.0	119.0	12.0	0.1 ug/L	0.2 ug/L	3.18 x MDL
10.	Conductivity	---																			
11.	Copper - Flame	---							1000												
	Copper - Furnace	---							1000												
	Copper - ICP	200.7	92.94	4.71	Multi	Apx C	3	10 %	1000	1 mg/L	83.0	103.0	9.5	82.0	104.0	82.0	104.0	9.5	6 ug/L	20 ug/L	3.18 x MDL
	Copper - ICP/MS	200.8	97.56	6.39	Multi	Tbl 12	3	10 %	1000	1 mg/L	84.0	111.0	13.0	83.0	112.0	83.0	112.0	13.0	0.09 ug/L	0.2 ug/L	3.18 x MDL
	Copper - STGFAA	200.9	111.5	10	Single	Tbl IE	3	10 %	1000	10 ug/L	75.0	148.0	36.0	71.0	152.0	71.0	152.0	36.0	0.7 ug/L	2 ug/L	3.18 x MDL
12.	Cyanide - CATC	---							200												
	Cyanide - Spectro/Man	---							200												
	Cyanide - Spectro/Auto	335.4	100	10	No data	Default	3	10 %	200	200 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0		5 ug/L	Range
	Cyanide - ISE	---							200												
13.	Fluoride - Elec/man	---							2000												
	Fluoride - Elec/auto	---							2000												
	Fluoride - SPADNS	---							2000												
	Fluoride - Auto/Aliz	---							2000												
	Fluoride - IC	300.0	87.7	5	Single	MCAW W	3	10 %	2000	2 mg/L	69.0	106.0	18.0	67.0	108.0	67.0	108.0	18.0	5 ug/L	20 ug/L	3.18 x MDL
14.	pH - Electrode	150.1	---	---					6.5-8.5												
	pH - Auto	150.2	---	---					6.5-8.5												
15.	Lead - Furnace	---							---												
	Lead - ICP/MS	200.8	100.20	12.10	Multi	Tbl 12	3	10 %	---	10 ug/L	76.0	125.0	25.0	73.0	127.0	73.0	127.0	25.0	0.6 ug/L	2 ug/L	3.18 x MDL
	Lead - STGFAA	200.9	101.80	4.00	Single	Tbl IE	3	10 %	---	10 ug/L	87.0	117.0	15.0	85.0	118.0	85.0	118.0	15.0	0.7 ug/L	2 ug/L	3.18 x MDL
16.	Mercury - CV/Man	245.1	100.34	43.82	Multi	MCAW W	3	10 %	2.0	2 ug/L	12.0	188.0	88.0	3.0	197.0	3.0	197.0	88.0		0.2 ug/L	Range
	Mercury - CV/Auto	245.2	102	4.5	Single	MCAW W	3	10 %	2.0	2 ug/L	85.0	119.0	17.0	84.0	120.0	84.0	120.0	17.0		0.2 ug/L	Range

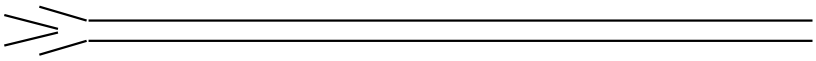
Standardized QC and QC Acceptance Criteria for Methods in 40 CFR 141.23(k)(1)

		Data					Specs													
											IPR			OPR		MS/MSD				
		Reference		Prec-			CAL		MCL	Spike	Recovery		Prec-	Recovery		Recovery			ML	ML	
No.	Analyte	Method	Recovery	ision	Labs	Source	Points	Lin	(ug/L)	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	Mercury - ICP/MS	200.8	100	10	No data	Default	3	10 %	2.0	2 ug/L	64.0	136.0	36.0	60.0	140.0	60.0	140.0	36.0	No data		
17.	Nickel - Flame	---							100												
	Nickel - Furnace	---							100												
	Nickel - ICP	200.7	95.48	10.44	Multi	Apx C	3	10 %	100	100 ug/L	74.0	117.0	21.0	72.0	119.0	72.0	119.0	21.0	15 ug/L	50 ug/L	3.18 x MDL
	Nickel - ICP/MS	200.8	95.11	5.16	Multi	Tbl 12	3	10 %	100	100 ug/L	84.0	106.0	11.0	83.0	107.0	83.0	107.0	11.0	0.5 ug/L	2 ug/L	3.18 x MDL
	Nickel - STGFAA	200.9	103.8	4.3	Single	Tbl IE	3	10 %	100	20 ug/L	88.0	120.0	16.0	86.0	121.0	86.0	121.0	16.0	0.6 ug/L	2 ug/L	3.18 x MDL
18.	Nitrate - IC	300.0	100.7	5	Single	MCAWW	3	10 %	10000	10 mg/L	82.0	119.0	18.0	80.0	121.0	80.0	121.0	18.0	13 ug/L	50 ug/L	3.18 x MDL
	Nitrate - Cd/Auto	353.2	97.31	7.10	Multi	MCAWW	3	10 %	10000	2.5 mg/L	83.0	112.0	15.0	81.0	113.0	81.0	113.0	15.0		50 ug/L	Range
	Nitrate - ISE	---							10000												
19.	Nitrite - IC	300.0	97.7	5	Single	MCAWW	3	10 %	1000	0.1 ug/L	79.0	116.0	18.0	77.0	118.0	77.0	118.0	18.0	4 ug/L	10 ug/L	3.18 x MDL
	Nitrite - Cd/Auto	353.2	97.31	7.10	Multi	MCAWW	3	10 %	1000	2.5 mg/L	83.0	112.0	15.0	81.0	113.0	81.0	113.0	15.0		50 ug/L	Range
	Nitrite - Spec/Auto	---							1000												
	Nitrite - Spec/Auto	---							1000												
20.	O-phosphate - IC	300.0	100.4	3.8	Single	MCAWW	3	10 %	---	500 ug/L	86.0	115.0	14.0	85.0	116.0	85.0	116.0	14.0	61 ug/L	200 ug/L	3.18 x MDL
	O-phosphate - Asc/Auto	365.1	87.2	22	Multi	MCAWW	3	10 %	---	300 ug/L	43.0	132.0	45.0	38.0	136.0	38.0	136.0	44.0		10 ug/L	Range
	O-phosphate - Asc/Sing	---							---												
	O-phosphate - Phos/Mo	---							---												
	O-phosphate - Auto/seg	---							---												
	O-phosphate - Auto/Dis	---							---												
21.	Selenium - Furnace	---							50												
	Selenium - Hydride	---							50												
	Selenium - ICP/MS	200.8	102.48	9.8	Multi	Tbl 12	3	10 %	50	50 ug/L	82.0	123.0	20.0	80.0	125.0	80.0	125.0	20.0	7.9 ug/L	20 ug/L	3.18 x MDL

Standardized QC and QC Acceptance Criteria for Methods in 40 CFR 141.23(k)(1)

		Data					Specs				IPR			OPR		MS/MSD					
		Reference		Prec-			CAL		MCL	Spike	Recovery		Prec-	Recovery		Recovery			ML	ML	
No.	Analyte	Method	Recovery	ision	Labs	Source	Points	Lin	(ug/L)	conc	Low	High	ision	Low	High	Low	High	RPD	MDL	Value	Calc
	Selenium - STGFAA	200.9	88.9	10	Single	Tbl IE	3	10 %	50	25 ug/L	52.0	125.0	36.0	48.0	129.0	48.0	129.0	36.0	0.6 ug/L	2 ug/L	3.18 x MDL
22.	Silica - ICP	200.7	53.86	45.38	Multi	Apx C	5	25 %	---	1 mg/L	d	145.0	91.0	d	154.0	d	154.0	91.0	58 ug/L	200 ug/L	3.18 x MDL
	Silica - Color	---							---												
	Silica - Color/Mo Blue	---							---												
	Silica - Molybdosil	---							---												
	Silica - Heteropoly	---							---												
	Silica - Auto/Mo react	---							---												
23.	Sodium - Flame	---							---												
	Sodium - ICP	200.7	99.77	24.27	Multi	Apx C	5	25 %	---	1 mg/L	51.0	149.0	49.0	46.0	154.0	46.0	154.0	49.0	29 ug/L	100 ug/L	3.18 x MDL
24.	Temperature	---																			
25.	Thallium - ICP/MS	200.8	101.5	14.5	Multi	Tbl 12	3	10 %	2.0	2 ug/L	72.0	131.0	29.0	69.0	134.0	69.0	134.0	29.0	0.3 ug/L	1 ug/L	3.18 x MDL
	Thallium - STGFAA	200.9	95.4	2.8	Single	Tbl IE	3	10 %	2.0	20 ug/L	85.0	106.0	11.0	84.0	107.0	84.0	107.0	11.0	0.7 ug/L	2 ug/L	3.18 x MDL

Appendix G



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